

MATERIALS RESEARCH SOCIETY OF SERBIA  
INSTITUTE OF TECHNICAL SCIENCES OF SASA



*Programme and the Book of Abstracts*

**EIGHTEENTH YOUNG RESEARCHERS' CONFERENCE  
MATERIALS SCIENCE AND ENGINEERING**

Belgrade, December 4–6, 2019

<http://www.mrs-serbia.org.rs/index.php/young-researchers-conference>

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**Materials Research Society of Serbia  
&  
Institute of Technical Sciences of SASA**

**November 2019, Belgrade, Serbia**

Book title:

Eighteenth Young Researchers' Conference - Materials Science and Engineering:  
Program and the Book of Abstracts

Publisher:

Institute of Technical Sciences of SASA  
Knez Mihailova 35/IV, 11000 Belgrade, Serbia  
Tel: +381-11-2636994, 2185263, <http://www.itn.sanu.ac.rs>

Editor:

Dr. Smilja Marković

Technical Editor:

Aleksandra Stojičić

Cover page: Aleksandra Stojičić and Milica Ševkušić

Cover: Modified Photo by Miloš Stošić; Wikimedia Commons

([https://commons.wikimedia.org/wiki/File:Бедѐми\\_-\\_поглед\\_на\\_Ушће.jpg](https://commons.wikimedia.org/wiki/File:Бедѐми_-_поглед_на_Ушће.jpg)); Creative Commons Attribution-Share Alike 3.0 Unported license

Printer:

Gama digital centar  
Autoput No. 6, 11070 Belgrade, Serbia  
Tel: +381-11-6306992, 6306962  
<http://www.gdc.rs>

Edition:

130 copies

CIP - Каталогизација у публикацији

Народна библиотека Србије, Београд

66.017/.018(048)

**YOUNG Researchers Conference Materials Sciences and Engineering (18 ; 2019 ; Beograd)**

Program ; and the Book of abstracts / Eighteenth Young Researchers' Conference Materials Sciences and Engineering, December 4-6, 2019, Belgrade, Serbia ; [organized by] Materials Research Society of Serbia & Institute of Technical Sciences of SASA ; [editor Smilja Marković]. - Belgrade : Institute of Technical Sciences of SASA, 2019 (Belgrade : Gama digital centar). - XX, 102 str. : ilustr. ; 23 cm

Tiraž 130. - Registar.

ISBN 978-86-80321-35-6 (ITSSASA)

a) Наука о материјалима -- Апстракти б) Технички материјали – Апстракти

COBISS.SR-ID 281006348

## **Aim of the Conference**

Main aim of the conference is to enable young researchers (post-graduate, master or doctoral student, or a PhD holder younger than 35) working in the field of materials science and engineering, to meet their colleagues and exchange experiences about their research.

## **Topics**

Biomaterials  
Environmental science  
Materials for high-technology applications  
Materials for new generation solar cells  
Nanostructured materials  
New synthesis and processing methods  
Theoretical modelling of materials

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### Results of the Conference

Beside printed «Program and the Book of Abstracts», which is disseminated to all conference participants, selected and awarded peer-reviewed papers will be published in journal “Tehnika – Novi Materijali”. The best presented papers, suggested by Session Chairpersons and selected by Awards Committee, will be proclaimed at the Closing Ceremony. Part of the award is free-of-charge conference fee at YUCOMAT 2020.

### Sponsors



**ANALYSIS**  
LABORATORY EQUIPMENT

### Acknowledgement

The editor and the publisher of the Book of abstracts are grateful to the Ministry of Education, Sciences and Technological Development of the Republic of Serbia for its financial support of this book and The Eighteenth Young Researchers' Conference - Materials Sciences and Engineering, held in Belgrade, Serbia.

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**The influence of thermodynamic parameters of the alkaline activator  
on the mechanical properties of geopolymers**

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In order to optimize process of geopolymerization, the investigation of thermodynamic parameters of alkali activators are important. The aim of this research was to investigate the influence of thermodynamic parameters (density, viscosity, refractive index and sound velocity) of alkaline activators on mechanical properties (compressive strength and hardness) of synthesized geopolymer samples. Geopolymers were synthesized by alkaline activation of metakaolin, having the density 2.524 g/cm<sup>3</sup>, using the activators at elevated temperature of 60 °C for two days. Based on the obtained results thermodynamic properties has been selected to predict the properties of materials.

Four series of alkaline activators have been used. Activators remarked as AA1, AA2, AA3 and AA4 present the mixtures of Na<sub>2</sub>SiO<sub>3</sub> and solutions of NaOH, of different molarities 2M, 4M, 6M and 8M respectively. The volume ratio of Na<sub>2</sub>SiO<sub>3</sub> and aqueous solution of NaOH was the same for all samples. Densities, viscosities and refractive indices of alkaline activators were determined over the temperature range 15-60 °C of process of geopolymerizations. The values of density, viscosity and refractive index decrease with temperature increase over the investigated temperature range. Increasing molarity of alkali activator solutions, the sound velocity of activators is changed. For sample AA2 the values of sound velocity rises from room temperature to 45 °C and then begins to decrease while for the sample AA3 sound velocity grows until 30 °C and then starts to decrease with further increasing of temperature. Four series of geopolymer samples GP1 to GP4 were synthesized using the constant ratio of solid and liquid phase. FTIR, XRD, SEM-EDS methods were used for physicochemical further characterization of geopolymer samples.